CALIFORNIA DIVISION OF MINES AND GEOLOGY

FAULT EVALUATION REPORT FER-116

April 10, 1981

1. Name of fault.

   San Gregorio and related faults.

2. Location of fault.

   Southwestern San Mateo and westernmost Santa Cruz Counties, California (see Figure 1).

3. Reason for evaluation.

   Part of a 10-year program to re-evaluate and revise existing Special Studies Zones maps (see Hart, 1980). New data (Weber and Lajoie, 1980; Weber and Cotton, 1980) received. The existing SSZ maps are included as Figures 2A, 2B, 2C, and 2D.

4. List of references.

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Brown, R.D., 1972, Active faults, probable active faults, and associated fracture zones, San Mateo County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-355.

California Division of Mines and Geology, 1976a, Official map of Special Studies Zones, Ano Nuevo quadrangle.

__________, 1976b, Official map of Special Studies Zones, Franklin Point quadrangle.

__________, 1976c, Official map of Special Studies Zones, La Honda quadrangle

__________, 1976d, Official map of Special Studies Zones, San Gregorio quadrangle.

Clark, J.C., 1970, Geologic map of the southwestern Santa Cruz Mountains

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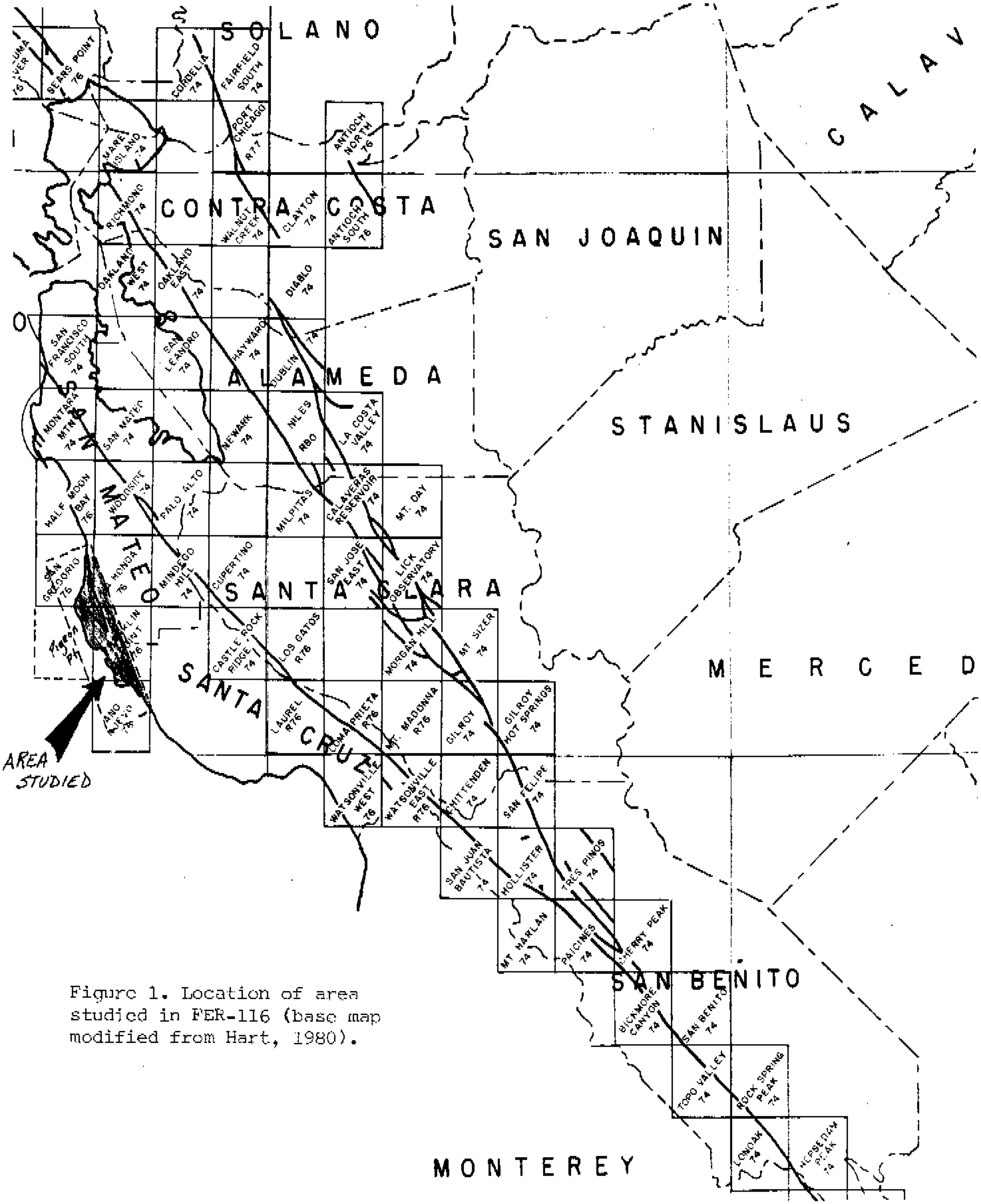

Figure 1. Location of area studied in FER-116 (base map modified from Hart, 1980).

between Ano Nuevo Point and Davenport, California: U.S. Geological Survey Open-File Map.

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Fairchild, 1941, Black and white aerial photos, flight C6660, numbers 93 to 105, 158 to 163, 389 to 398, and 445 to 446, scale approximately 1:24,000, obtained from the Whittier College Collection.

Gawthrop, W.H., 1978, Seismicity and tectonics of the central California coastal region, in San Gregorio-Hosgri fault zone, California: California Division of Mines and Geology Special Report 137, p. 45-56.

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Hall, N.T., A.M. Sarna-Wojcicki, and W.R. Dupre, 1974, Faults and their potential hazards in Santa Cruz County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-626.

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Lajoie, K.R., G.E. Weber, Scott Mathieson, and James Wallace, 1979, Quaternary tectonics of coastal Santa Cruz and San Mateo Counties, California, as indicated by deformed marine terraces and alluvial deposits, in Field trip guide, coastal tectonics and coastal geologic hazards in Santa Cruz and San Mateo Counties, California: Cordilleran Section of the Geological Society of America "75th Annual Meeting," p. 61-80.

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Silver, E.A., 1978, The San Gregorio-Hosgri fault zone: An overview, in San Gregorio-Hosgri fault zone, California: California Division of Mines and Geology Special Report 137, p.1-2.

Silver, E.A., and W.R. Normark, eds. 1978, San Gregorio-Hosgri fault zone, California: California Division of Mines and Geology Special Report 137.

Weber, G.E., 1975, Unpublished map (thesis work in progress) of the San Gregorio fault based largely on aerial photographic interpretation with some field mapping: University of California, Santa Cruz.

Weber, G.E., and W.R. Cotton, 1980, Geologic investigation of recurrence intervals and recency of faulting along the San Gregorio fault zone, San Mateo County, California: Unpublished consulting report by William Cotton and Associated for the U.S. Geological Survey (Contract No. 14-08-0001-16822).

Weber, G.E., and K.R. Lajoie, 1974, Holocene movement on the San Gregorio fault zone near Ano Nuevo, San Mateo County, California [abs.] : Geological Society of America Abstracts with Programs, V.6, m.3, p.273.

__________, 1980, Map of Quaternary faulting along the San Gregorio fault zone, San Mateo and Santa Cruz Counties, California: U.S. Geological Survey Open-File Report 80-907.

5. Summary of available data.

The San Gregorio fault zone reportedly is part of a larger fault zone, known as the San Gregorio-Hosgri fault zone. Total length of the latter is nearly 400 km (Silver, 1978, p. 1). Holocene movement on the San Gregorio fault has been documented by Coppersmith and Griggs (1978), Weber and Cotton (1980), and Weber and Lajoie (1974; 1980). Green, et al (1973), believe that Holocene fault movement has probably occurred along an offshore segment of the fault just south of the area addressed in this FER.

The original Special Studies Zones maps (Jan. 1, 1976) of this segment (California Division of Mines and Geology, 1976a; 1976b; 1976c; and 1976d; included as Figures 2A, 2B, 2C and 2D) were based largely on the work of Weber (1975), supplemented by work of Hall, et al (1974), Brown (1972), and Clark (1970). At the time the 1976 SSZ maps were compiled, Weber was still gathering much of his basic data. And, except for the maps by Clark (1970) and Weber (1975), all of the maps used in the original compilations were smaller than 1:24,000 scale. In general, the approach used in this FER was to evaluate the new, presumably more-detailed data. Weber's (1975) work has not been re-examined here because his data was, I assume, incorporated in his later maps where valid, and modified where appropriate.

Weber and Cotton (1980, p. 12 and 63) noted that numerous fault strands exist in the San Gregorio fault zone (see Figure 3). They further state that the pattern of faulting is complex and that the faults are generally poorly exposed. They believe that most of the movement has occurred on two fault strands, the Frijoles segment and the Coastways segment, but that all of the numerous secondary faults have been active during the late Pleistocene. Their study was directed primarily at examining the secondary reverse faults in the zone. Except for the vicinity of Ano Nuevo, the maps included in their report are small-scale and tend to obscure the complexity of the zone.

Most of the Weber and Cotton (1980) report addresses two faults, the Ano Nuevo thrust (segment 1 in this report)* and the Frijoles segment (segments 3, 12, and 13). The former is a relatively small secondary fault having a total known onshore surface length of about 600 feet, with a maximum vertical displacement during the last 105,000 years of 18 feet (see Figure 3A). Recurrent movement has occurred along the fault, with the number of fault events totalling from 6 to 9. Sag pond deposits dated at 6060 ± 105 years b. p. are offset by this fault (p. 44). Weber and Cotton speculate that the fault may extend northwestward, but present no evidence to support their speculation.

They describe the Frijoles fault as well-exposed in the sea cliff southeast of Point Ano Nuevo (segment 3, Figure 3A), and report only four other exposures (two of which are man-made) along the 19km-long zone. However, they report

*Segments are arbitrarily numbered as shown on the various figures in this report.

"... the fault can be mapped with reasonable certainty along most of its 19-km length largely on the basis of moderately to well-developed geomorphic features such as scarps, sag ponds, and lineaments." They then proceed to describe broad linear valleys and apparently discordant marine terraces in the area along and north of the Arroyo de los Frijoles as major evidence for the existance of the fault. Furthermore, they state (on p.67) that because of the complexity of faulting and the poorly preserved geomorphic features "... it is impossible to map all of the fault strands and fractures and to delineate with certainty the connections between individual fault strands within the Frijoles fault complex." In fact, they present four alternative patterns of faulting for the area of their intensive study. As for recency, they report that Holocene deposits exhibit drag folds along the Frijoles zone, but that deposits younger than the 105,000 year old terrace were lacking along much of the zone.

Weber and Cotton made a number of assumptions and qualify many of their theories concerning recency of movement. In large part, they appear to have concentrated on determining maximum credible earthquakes and recurrence intervals for various faults. They take issue with the theory that secondary faults are not the site of major displacements or large earthquakes but believe that such movement does not occur along each secondary fault during each earthquake event. This is reflected in their conclusions, most of which are beyond the purpose and scope of this FER.

Finally, although there is little indication in their report that they studied the Coastways segment (segments 5, 8, 9, 14, and 15) in any detail, they conclude (p. 93) that both the Frijoles and Coastways segments have had "continuing activity" since the mid-late Tertiary. They state that the Coastways segment was the primary zone of displacement from about 220,000 ybp to 105,000 ybp, but that most of the movement within the San Gregorio fault zone has occurred along the Frijoles segment during the last 105,000 years.

Weber and Lajoie (1980) prepared a detailed map of the San Gregorio fault zone, profusely annotated. They delineated not only features believed to be faults, but numerous lineaments of unknown origin as well. Those features they depict as probably Holocene or late Pleistocene faults are shown Figures 3A, 3B, 3C, 3D and 3E, along with a summary of their annotations.

Where their work overlaps with that of Weber and Cotton (1980), the data are similar, although some of the statements reflecting various uncertainties have been omitted on the Weber and Lajoie version.

In spite of Weber and Cottons' statement that the Frijoles fault is well-defined, Weber and Lajoie do not depict a well-defined Frijoles zone between Whitehouse Creek and Pescadero Creek (Figure 3B and 3C). Instead, they show a zone of discontinous faults drawn largely on the basis of broad linear features or shown as entirely concealed by young alluvium. Also, although the zone is supposed to consist mostly of reverse faults, the lineaments shown are almost all straight-line segments. Neither do they indicate any topographic features generally accepted as being "hard data" indicative of Holocene fault movement in this area. At the northern end of the Frijoles (segment 13, Figure 3E), Weber and Lajoie refer to thrust or reverse faults cutting terrace deposits. Weber (p. c., 3/81) stated that the terrace deposits are indeed cut by at least one of the faults, but they have not been able to date or correlate any of the terrace deposits in the vicinity.

Similarly, hard data indicative of Holocene movement are notably absent from the Coastways segment in the areas between Cascade Creek and Old Womans Creek (segment 8, Figure 3B), and north of Pescadero Creek (segments 14 and 15, Figures 3D and 3E). Lajoie, et al (1979, p. 71), note that the terraces across the Coastways segment north of San Gregorio Creek (in the area of segment 15) are discontinous, and that it is "impossible to correlate terrace remnants" across the Coastways at this site. Brabb (1980) shows terrace deposits at about the 400 foot elevation on both sides of the zone near the mouth of San Gregorio Creek, and depicts 3 of the main traces as not cutting Pleistocene alluvium, and one trace as not cutting Pleistocene terrace deposits. He does show some of these faults as bordering Pleistocene terrace deposits in 3 locations and bordering Holocene colluvium in one.* It is thus open to interpretation as to whether these faults cut these deposits or have been deposited against a fault plane. However, the fault shown bordering the Holocene colluvium (segment 14) is one shown clearly as concealed by Pleistocene alluvium, and therefore the colluvium is probably not faulted. Also, he does not show any faults in the vicinity of the mouth of Pescadero Creek (segment 13).

Weber and Lajoie (1980) present mixed data on the Greyhound Rock faults (Figure 3A). They state one trace is probably not Holocene, and the other may be Holocene. See also, Figures 3A, B, C, D, and E for site-specific data.

6. <u>Air photo interpretation; field data.</u>

Time did not permit me to field check any of the data discussed in this

* On April 14, 1981, I met with Brabb and questioned him concerning the faults and their relationship to the terrace and colluvial deposits. He indicated he compiled these traces from Touring who depicted the faults as shown by Brabb. Brabb has not field checked these faults personally, and knows of no data to support the faults cutting these deposits.

report. In the past, while employed as staff geologist with the California Department of Parks and Recreation (1978-1980), I had occasion to meet in the field with Weber during their investigation of segment 1, which is clearly exposed in the seacliff.

Fairchild (1941) air photos were interpreted and the data plotted (see Figures 4A, 4B, 3C, 3D, and 3E). No evidence of Holocene fault movement was observed along the Greyhound Rock faults (segment 6, Figure 4A). While some possible troughs were observed nearby, they did not occur along the faults mapped by Weber and Lajoie (1980).

Sand dunes have obscured any surface features produced by recent faulting along segments 1 and 2 (Figures 4A and 4B). Also, the direction of the prevailing winds is such that Green Oaks Creek would be unlikely to cross the dunes. Holocene fault-produced topography is not present along the shear zone identified by Weber and Lajoie (1980) at the north end of segment 2.

The Coastways segment was generally not well-defined and not clearly Holocene except along segment 9 (Figure 4B). Only this central segment appears to be active, and some of its strands appear to be well-defined. To the south, the major (main) zone of displacement appears to be along segment 3 (part of the Frijoles). I was not able to find any well-defined or moderately well-defined active fault to the north. No through-going, recent, strike-slip fault could be followed along the Frijoles north of segment 3. Features observed along each of the numbered segments are noted below.

For notes on segments 1 and 2; see above, third paragraph of section 6.

Segment 3 (Figures 4A and 4B) appears to consist of a zone of several very well-defined strands with conclusive evidence of Holocene or latest

Pleistocene faulting (linear troughs, scarps in young deposits, deflected drainages). My interpretation differs in detail from the faults of Weber and Lajoie (1980) and Weber and Cotton (1980), but the features I see are generally within 200 feet of their traces. In some cases I have traced features suggestive of recent faulting on trend with but beyond the features they show as Holocene or late Pleistocene faults.

Features noted along segment 4 (Figure 4A) do not appear to be in a single, continuous line. Instead, the creek appears to not be linear, suggesting that it is not controlled by a single fault as implied by Weber and Cotton (1980) or Weber and Lajoie (1980).

Segment five (Figures 4A and 4B) consists of several scarps, tonals, and breaks in slope which are fairly discontinuous. Also, observed were features indicating the area to the east may be moving downslope, except for a scarp which may be in Holocene alluvium, at least in part, no ~~c~~onclusive evidence of Holocene faulting was noted along this segment.

For notes on segment 6, see above.

A discontinuous series of tonal lineaments was noted along segment 7; (Figure 4B). This feature could be a fault, or could be man-made, at least in part. Two closed depressions lie near the northwestern end of this line of tonals.

Segment 8 (Figure 4B) consists mostly of a discontinuous series of breaks in slope, suggestive of an old fault. There is little to suggest a late Holocene fault is present along this trend, although minor Holocene displacements could have occurred here. Also, the features I noted did not align precisely with those shown by Weber and Lajoie (1980). ¶ The features visible along segment 9 (Figure 4B) suggest that a Holocene fault, which is moderately well-defined, exists along this trend. Small drainages appears to be right-laterally deflected; troughs, tonal lineaments, and other features are also present. The large deflections of each of the major drainages crossing this trend suggest that the total displacement has been fairly large (about 3 miles) during late Quaternary time. One of these large drainages (Little Butano Creek) appears about to be captured.

Segment 10 (Figure 4B) consists of a series of parallel scarps, a graben, and several sag ponds. Weber and Lajoie (1980) show these features as related to Holocene faulting. However, the visible evidence is highly suggestive that downslope movement (lateral spreading of the ridgetop) is the true cause, but that the features are well-defined and young (Holocene).

Segment 11 (Figure 4B) was originally zoned (CDMG, 1976b). Weber and Lajoie (1980) show this feature as a lineament along which large scale landslides have occurred. I observed evidence of massive landslides, perhaps originating along an old fault. The northern teminus of this zone appears to be about as far north (the northern boundary of the Franklin Point quadrangle) as the northernmost end of moderately well-defined, active fault zone (segment 9).

Segment 12 (Figure 4B and 3C) was not a well-defined fault zone. Indeed, no through-going features were noted that would suggest the existance of an active fault. Even Weber and Lajoie (1980) failed to find a simple, throughgoing fault zone in this area.

Segment 13 (Figure 3E) was carefully examined. A bench, tonal lineament, and a broad scarp were noted along this hillfront, on trend with Weber and Lajoie's reverse faults, but no clear evidence of Holocene fault displacement along the zone mapped was observed.

No clear evidence of recent faulting was observed along segment 14 (Figure 3D and 3E). The few features that could have conceivably (but certainly not unequivocably) resulted from faulting could not be traced for any distance and did not align with similar features to the north or south. Streams (such as

Pomponio Creek) did not appear to be offset by any great amount as are the streams along segment 9. Similarly, San Gregario Creek (segment 15) does not appear to be offset with one possible exception; however, this apparent right-lateral bend could be explained by the meandering nature of the creek. No evidence to support Holocene faulting was noted to the north or south on this trend. No sharp, well-defined scarps or similar features were noted along faults of either segment 14 or 15.

7. Seismicity.

Few seismic events have been recorded in the study area (see Figure 5). During the period from 1900 to 1974, most of the nearby seismic activity has been associated with the San Andreas fault, although a few events have occurred in the vicinity of the Butano and Zayante faults.

8. Conclusions.

Weber and Cotten (1980) and Weber and Lajoie (1980) have demonstrated that some fault strands within the southern part of the San Gregorio fault zone have had recurrent movement along them, including movement during Holocene time. They have also indicated that the zone of faulting is complex but that many individual strands are well defined. My work tends to support their data in the southern part of the zone. However, to the north, several of the fault segments delineated by Weber and Lajoie are poorly defined, lacking good evidence of Holocene or even late Quaternary activity, or both (see below for details).

It is tempting to conclude that, because Holocene movement has been demonstrated along the Seal Cove fault to the north (Lajoie, p.c., March 1981) as well as near Point Ano Nuevo, an active strike-slip fault must traverse the area studied. However, the detailed study by Weber and Cotton clearly document that the zone consists of active oblique or thrust faults, as well as

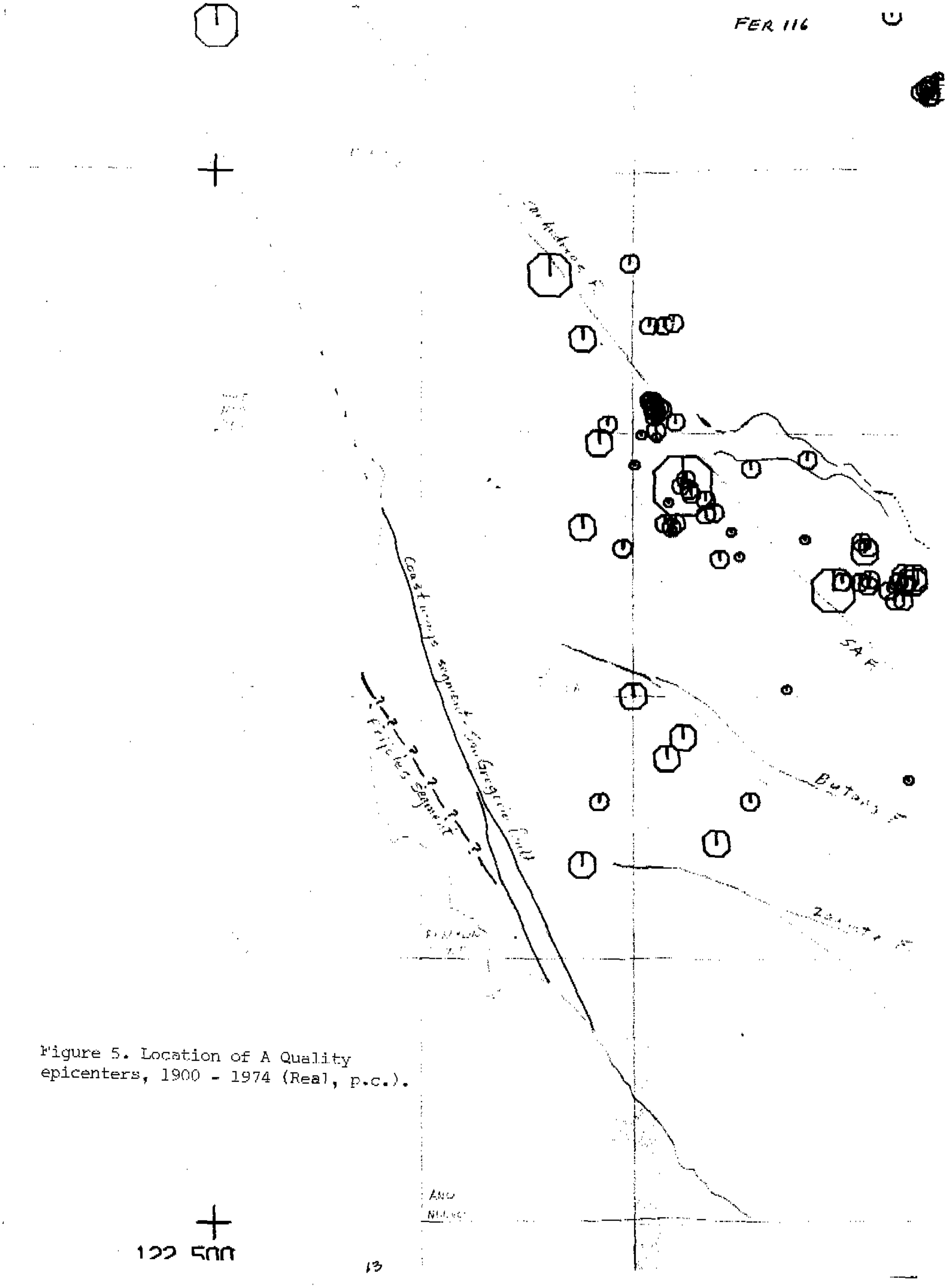

Figure 5. Location of A Quality
epicenters, 1900 - 1974 (Real, p.c.).

strike-slip faults. Thus, it is distinctly possible that the Coastways segment may not be everywhere active, or at least not well-defined. Weber and Lajoie have identified reverse faults, located near the mouth of Pescadero Creek, along which reverse movement has probably occurred during the late Quaternary. It is conceivable that reverse-slip movement may predominate over strike-slip movement in the northern part of the zone. Specific conclusions are as follows.

Segment 1 (Figure 6A): Weber and Cotton (1980) have demonstrated that fault movement has occurred along a 600-foot long, well-defined thrust fault in the last 6060± years. Therefore this segment is sufficiently active (Holocene) and well-defined to warrant zoning.

Segment 2 (Figure 6A): This thrust fault cuts a late Pleistocene marine terrace. The evidence for recent faulting northward of the present SSZ is speculative. It lies close to and between two Holocene faults, and is well-defined in its cliff exposure only.

Segment 3 (Figure 6A and 6B): This segment clearly cuts Holocene deposits, and is well-defined by geomorphic features. Therefore, it meets the present criteria of sufficiently-active and well-defined.

Segment 4 (Figure 6A): Evidence that a fault exists along this trend is speculative. No hard evidence has been found suggesting a fault exists here as shown on Figure 3A. Lacking such evidence, I cannot find that the "fault" is sufficiently well-defined. However, I also have no proof that the fault does not exist (it is currently in a SSZ (CDMG, 1976a)).

Segment 5 (Figures 6A and 6B): Evidence of Holocene fault movement has been postulated at only one locality along this segment, and is not conclusive because the age of the youngest unit cut is not known with certainty. Also, I differ slightly from Weber and Lajoie concerning the location of the fault at its northern end. Strong evidence of late Quaternary movement exists. The fault may be sufficiently well-defined and sufficiently active to warrant zoning.

Segment 6 (Figure 6A): These faults may be Holocene although evidence suggests the latest movement along the southwestern strand occurred prior to the Holocene. Both faults (or landslide planes) are fairly well-defined, according to Weber and Lajoie (1980).

Segment 7 (Figure 6B): Evidence for the existence of segment 7 is somewhat speculative. The features observed could in part, be man-caused but all are in Holocene deposits. Currently in the SSZ, the "fault" if it exists could be the connection between segments 5 and 3, and would have a thrust component. It is locally well-defined, but may not be a fault.

Segment 8 (Figure 6B): The evidence for the existance of this fault is weak and the features noted are discontinuous and not along the line mapped by Weber and Lajoie. If the fault, currently zoned, exists, then it is probably late Pleistocene in age but may have had minor movement along it during the Holocene. It does not clearly meet the present criteria for zoning in either sense, but I lack evidence to support its inativity. This fault could conceivably once have been the main zone of faulting, but it appears most of the strain is now being transmitted to the surface as thrust movement in the area of of the junction between segments 3 and 7.

Segment 9 (Figure 6B): Evidence summarized above supports the existance of a fault along which significant displacement has occurred during the late Pleistocene, probably continuing into the Holocene. The features are reasonably well-defined to permit zoning.

Segment 10 (Figure 6B): This segment appears to consist of a well-defined zone of linear traces ~~planes~~ along which major Holocene landslide movement has almost certainly occurred. Weber and Lajoie (1980) have depicted these features ~~planes~~ as faults. Although the cause of these features is in dispute, they nevertheless are evidence of a clear hazard.

Segment 11 (Figure 6B): This segment clearly consists of a long, fairly linear zone of large landslides. No evidence of Holocene fault movement exists along this zone; indeed, Weber and Lajoie (1980) did not recognize the lineament currently zoned as being a fault. Therefore, the feature appears to not meet the current criteria for zoning.

Segment 12 (Figure 6B and 3C): The features along this segment are broad and do not demonstrate Holocene, or even latest Pleistocene, fault movement has occurred. Therefore, this segment is not sufficiently active and well-defined to warrant zoning. Only part of this segment is currently zoned.

Segment 13 (Figure 3C): This segment is the only segment evaluated which is wholly not currently zoned. No evidence of Holocene fault movement has been presented by Weber and Lajoie (1980) or observed on the air photos interpreted. Therefore, this segment appears to not clearly be sufficiently active to warrant zoning.

Segment 14 and 15 (Figure 3D and 3E): These segments, although on-trend with segment 9 to the south and the Seal Cove fault to the north (a Holocene fault) cannot be followed with any certainty. Features indicative of Holocene movement along a through-going fault are lacking. Therefore, these segments do not constitute a sufficiently well-defined and active fault.

9. Recommendations:

Clearly the zoning of segments 1, 3 and 9 (Figures 6A and 6B) is warranted since these are faults that meet the current criteria of sufficiently active and well-defined. These appear to be the main active faults (except for segment 1 which is a secondary fault) in the zone. Also, since segment 13 (Figure 3C) does not meet current criteria for zoning, it should not be zoned. The fault depicted on the existing SSZ map (CDMG, 1976b-Franklin Point) along segment 11 should be deleted since neither Weber and Lajoie (1980) nor I believe this is an active fault.

Beyond these recommendations, the course of action is less clear. The criteria used in establishing the 1976 Special Studies zones was much broader than that currently used. Since we have no conclusive evidence that any of the faults shown on these (1976) maps have not been active during Holocene time, there is a possibility that an active fault might inadvertantly be removed. Since time did not permit me to conduct independant field mapping, there may be cause for additional concern. However, I note that Weber has been mapping in the area for several years, (as have some others although their efforts have been less intense) and yet he has been unable to present reasonably good evidence of Holocene fault activity along many of his postulated faults.

While the absence of evidence for recent faulting is not evidence for the absence of recent faults, there exists no clear evidence that any of the other "faults" mapped by Weber and Lajoie (1980), Weber and Cotton (1980), or Brabb (1980) are active (Holocene). Weber and Lajoie do indicate there is a scarp in Holocene fan deposits along segment 5; I agree there is a scarp, but suggest the "deposits" might be pre-Holocene in age.

I defer to their judgement since they have observed the feature in the field; therefore, it should probably be zoned.

Segment 10 (Figure 6B) consists of fault-like features that have probably resulted from Holocene slope failure. Future movements are likely here, and fractures will likely result during a major earthquake along the main fault. Thus, even though they may be non-tectonic, it is not necessarily improper to zone them, especially since they trend parallel with and adjacent to the main trace. Zoning is, therefore, recommended.

Although no clear evidence of Holocene movement exists along segment 2 (Figure 6A), it lies parallel with an active thrust (segment 1) and between two active segments (1 and 3). Since it is also a thrust, it would be inprudent to recommend removing it from the zone. However, data do not support the northward extension along Green Oaks Creek; there is no clear evidence that such a throughgoing fault exists northward of that shown on Figure 6A.

Segment 6 (Figure 6A) consists of either faults or landslide features which are fairly well-defined and at least one of which may be Holocene in age. Therefore, these faults should be zoned, since both definitely cut late Pleistocene units.

The existance of segment 4 (Figure 6A) has been inferred based on the course of Ano Nuevo Creek. It appears that no such fault exists since the deposits on trend to the north show no evidence of faulting. This fault should not be zoned.

The probable existance of an active fault along segment 5, along with the recognized thrust faults at the intersection of segments 7 and 3, and the absence of a clearly-defined late Holocene fault along segment 8 suggests that strain is being transferred in some manner from segment 5 to segment 3. If right-lateral slip has occurred in Holocene time along segment 5, then this transfer of strain could be taken up by folding or thrust faulting in the area of segment 7, and/or minor right-lateral slip along segment 8. Both segments 7 and 8 are presently in the Special Studies Zone. Features along segment 7 are in Holocene deposits. Although neither of these fairly short faults are geomorphically very well-defined, the possibility exists that Holocene faults could be detected along or near the traces delineated on Figure 6B. Therefore, it is prudent that I recommend zoning segments 7 and 8.

Evidence for the existance of active faults along segments 12, 14, and 15 (Figures 3C, 3D, and 3E) is practically non-existant, and equivocal at best. Weber and Lajoie (1980) do not present any evidence to support Holocene movement along these segments. Even they were unwilling to show continuous zones of faulting; and I could not find any well-defined, through-going set of features along either the trend of the Frijoles or Coastways segments in these areas. Indeed, the features along segment 13 (addressed above) are more suggestive of faulting during latest Quaternary time than are the features along any of these three segments. Therefore, these segments should not be zoned, and the existing zone maps of the La Honda and San Gregario quadrangles should be withdrawn.

Those segments to be zoned (segments 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10) should be depicted and zoned approximately as shown on Figures 6A and 6B. The faults should consist of traces from Weber and Lajoie (1980) and this report, as color coded on Figures 6A and 6B.

10. Investigating geologist; date.

Theodore C. Smith

THEODORE C. SMITH
Associate Geologist
RG 3445, CEG 1029
April 10, 1981

TCS/jab

I have reviewed the report and the aerial photos. The recommendations appear reasonable.
EWH
4/21/81

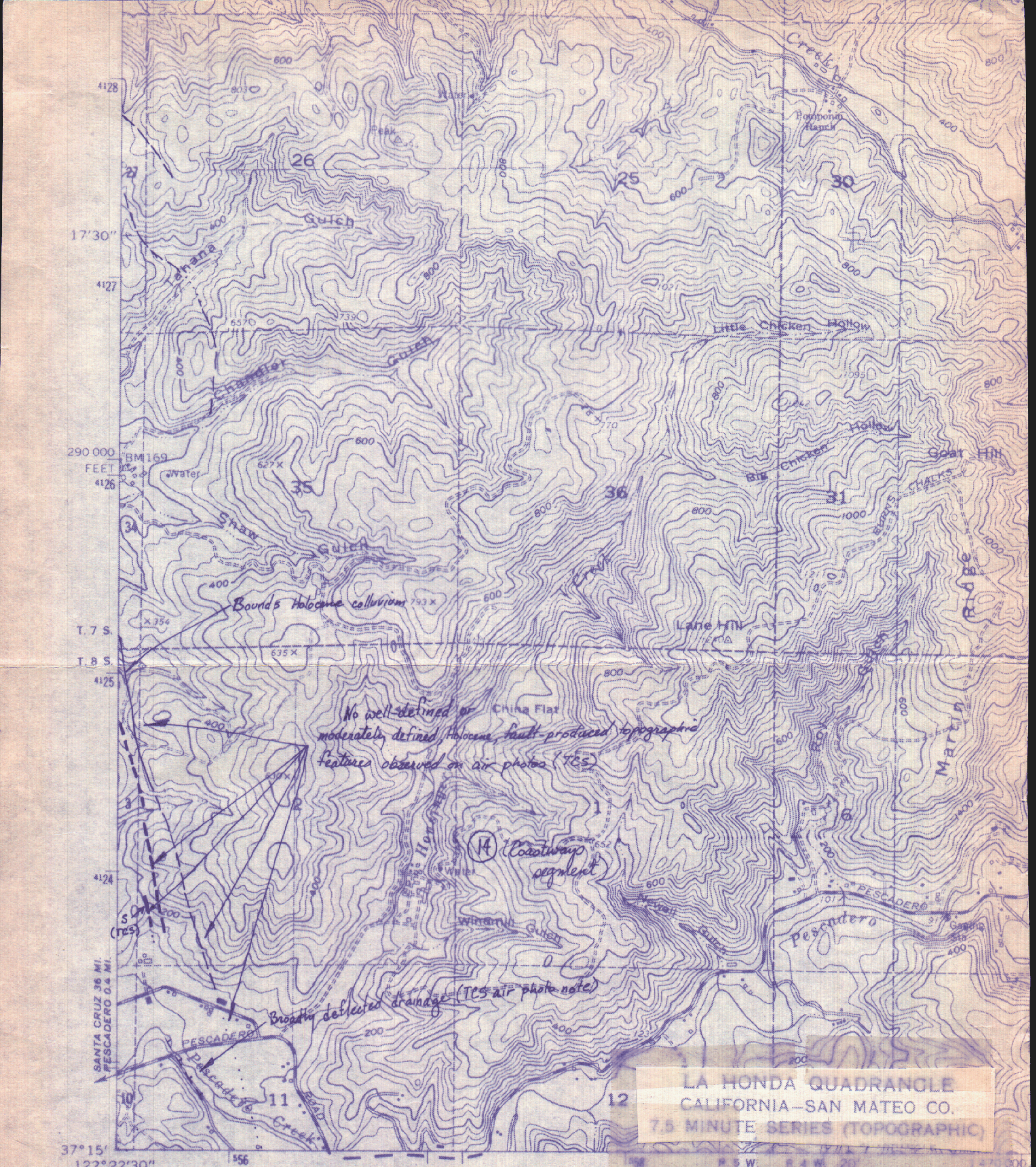

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Figure 3D. Faults from Weber and Lajoie (1980), which they classify as probably Holocene & from Brabb (1980), annotated with air photo notes.

From Weber & Lajoie (1980)

From Brabb (1980)

STATE OF CALIFORNIA
SPECIAL STUDIES ZONES

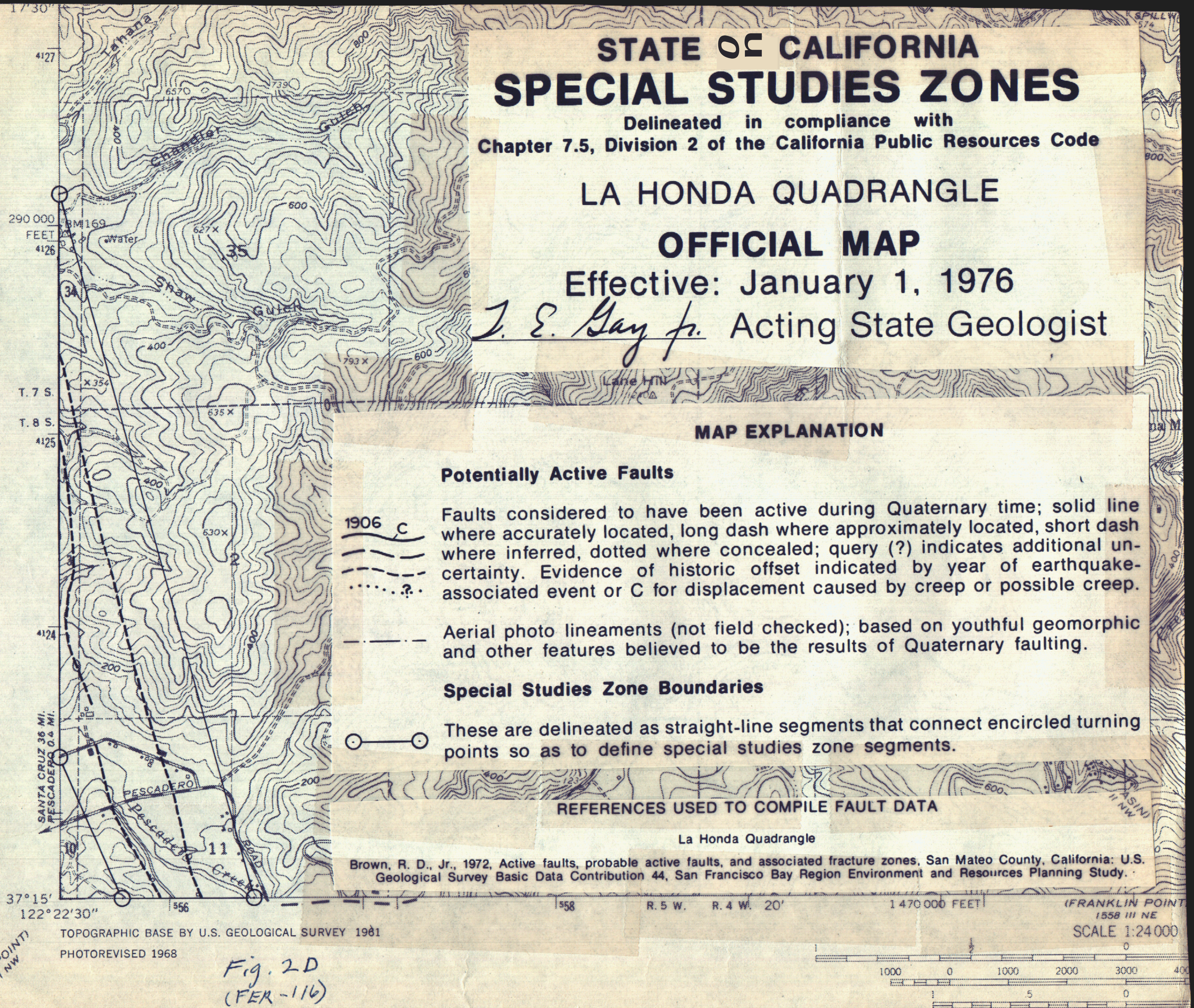
Delineated in compliance with
Chapter 7.5, Division 2 of the California Public Resources Code

LA HONDA QUADRANGLE

OFFICIAL MAP

Effective: January 1, 1976

T. E. Gay jr. Acting State Geologist



MAP EXPLANATION

Potentially Active Faults

1906 C

?

Faults considered to have been active during Quaternary time; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Aerial photo lineaments (not field checked); based on youthful geomorphic and other features believed to be the results of Quaternary faulting.

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

REFERENCES USED TO COMPILE FAULT DATA

La Honda Quadrangle

Brown, R. D., Jr., 1972, Active faults, probable active faults, and associated fracture zones, San Mateo County, California: U.S. Geological Survey Basic Data Contribution 44, San Francisco Bay Region Environment and Resources Planning Study.

TOPOGRAPHIC BASE BY U.S. GEOLOGICAL SURVEY 1961

PHOTOREVISED 1968

Fig. 2D
(FER-116)